

BEFORE THE  
**Federal Communications Commission**  
WASHINGTON, DC 20554

In the Matter of	)	
	)	
<b>LightSquared Subsidiary LLC</b>	)	IB Docket No. 11-109
	)	
Technical Working Group Report	)	
	)	
In re the Application of	)	
	)	
<b>LightSquared Subsidiary LLC</b>	)	File No. SAT-MOD-20101118-00239
	)	
Request for Modification of its Authority for	)	
an Ancillary Terrestrial Component	)	
To: The Commission		

**CONSOLIDATED REPLY COMMENTS OF THE U.S. GPS INDUSTRY COUNCIL**

**THE U.S. GPS INDUSTRY COUNCIL**

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## **SUMMARY**

In these Consolidated Reply Comments, the U.S. Global Positioning System Industry Council (the “USGIC”) responds to the more than 3,000 comments and views that have been filed in response to (i) the Technical Working Group (“TWG”) June 30 Final Report (“TWG Final Report”) on the potential for LightSquared Subsidiary LLC (“LightSquared”) 4G LTE terrestrial mobile broadband operations in the mobile-satellite service (“MSS”) bands at 1525-1559 MHz and 1626.5-1660.5 MHz to cause harmful interference to Global Positioning System (“GPS”) receivers and GPS-dependent applications; and (ii) LightSquared’s June 30 response and recommendations relating to the TWG Final Report.

The comments confirm that protection of GPS receivers and GPS-dependent applications requires the Commission to exclude 4G LTE service from the LightSquared MSS bands. Importantly, the comments make clear that there is no exception to this requirement for LightSquared 4G LTE terrestrial mobile broadband service that is limited to the “lower 10 MHz” of the 1525-1559 MHz band and power limited to a maximum EIRP of 32 dBW/sector.

The comments reflect overwhelming support for the TWG Final Report and its results showing that operation on the lower 10 MHz channel would cause harmful interference to GPS receivers and GPS-dependent applications in many categories, from high-precision and network receivers to nearly 70 million general location/navigation receivers to approximately 30 million mobile phones. Some of these commenters nevertheless urge the Commission to extend the condition preventing LightSquared’s commencement of 4G LTE operation while further testing is performed. The USGIC does not oppose further studies designed to maximize the efficient terrestrial use of the MSS band, as long as there is something new to study.

To date, LightSquared has put nothing new on the table that would support further studies of the lower 10 MHz proposal. The comments, however, include a number of unaddressed

concerns – such as issues regarding the electrical downtilt used in LightSquared transmitters, the compatibility of a LightSquared lower 10 MHz operation with aeronautical flight test operations that occur in the band immediately below 1525 MHz, and individual and aggregate emission issues with the untested (due to lack of prototype equipment) 4G LTE handsets in the 1626.5-1660.5 MHz band – that would have to be addressed in any further testing.

The USGIC also responds to assertions from LightSquared and its affiliates. Specifically, the USGIC rebuts anew LightSquared’s latest attempt to misconstrue the regulatory history of the ancillary terrestrial component (“ATC”) of MSS; debunks LightSquared’s baseless critique of GPS receiver designs and sensitivities; challenges LightSquared’s continued reliance on the amount of its expenditures to date on 4G LTE matters and other factors that are irrelevant to the resolution of the harmful interference issues; and corrects anew LightSquared’s understatement of both the number of GPS receivers and GPS-dependent applications that would be impacted by a LightSquared lower 10 MHz-only 4G LTE operation, and the extent of the impact. Finally, the USGIC deconstructs LightSquared’s assertion that Section 25.255 of the Commission’s Rules is inapplicable to harmful interference an ostensible ATC operator in the 1525-1559 MHz and 1626.5-1660.5 MHz band produces outside that frequency range. The rule is clear on its face and fully applicable to protect GPS from ATC interference.

In sum, the comments require the Commission to conclude that LightSquared’s three-pronged proposal is insufficient. Unless there are new developments from LightSquared, the Commission has no choice but to rescind the conditional waiver and forbid any 4G LTE operation in the 1525-1559 MHz and 1626.5-1660.5 MHz bands.

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The U.S. Global Positioning System Industry Council (the “USGIC”), by its attorneys and pursuant to the Commission’s June 30, 2011 Public Notice in IB Docket No. 11-109,<sup>1</sup> hereby presents these Consolidated Reply Comments to address the more than 3,000 comments and views that have been filed in response to (i) the Technical Working Group (“TWG”) June 30 Final Report (“TWG Final Report”) on the potential for LightSquared Subsidiary LLC (“LightSquared”) 4G LTE terrestrial mobile broadband operations in the mobile-satellite service (“MSS”) bands at 1525-1559 MHz and 1626.5-1660.5 MHz to cause harmful interference to

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<sup>1</sup> Public Notice, *Comment Deadlines Established Regarding the LightSquared Technical Working Group Report*, IB Docket No. 11-109, DA 11-1133 (released June 30, 2011) (“June 30 Notice”).

Global Positioning System (“GPS”) receivers and GPS-dependent applications;<sup>2</sup> and (ii) LightSquared’s June 30 response and recommendations relating to the TWG Final Report.<sup>3</sup>

## **I. Introduction**

Over the last 45 days, a broad cross section of individuals, businesses, state and local governments, and even foreign and international governmental organizations, have made their voices heard in a compelling effort to assure the protection of the GPS receivers and GPS-dependent applications that would experience harmful interference if LightSquared were allowed to operate a high-power terrestrial mobile broadband system in its licensed MSS bands.<sup>4</sup> Farmers, miners, surveyors, public safety organizations, consumer and industrial equipment manufacturers and distributors, airlines and pilots, and many more stressed the importance of GPS to their livelihoods and our national fabric. Removal of interference protection for GPS signals, the commenters argue, would return dozens of industries and processes to an era where improvements in efficiency and accuracy made possible by GPS and its evolutions did not exist – a result made worse by the fact that many of the less efficient and reduced-accuracy systems that predate the 1980s and 1990s have now been retired due to the success of GPS.

Now, just under nine months after LightSquared first sought to provide stand-alone terrestrial service, the record is crystal clear. LightSquared’s proposed terrestrial broadband use of the 1525-1559 MHz and 1626.5-1660.5 MHz bands would, without question, cause harmful

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<sup>2</sup> The TWG Final Report was issued by the Working Group formed pursuant to in *LightSquared Subsidiary LLC*, 26 FCC Rcd 566, 586 (Int’l. Bur. 2011) (“*LightSquared*”), review pending, to study the GPS overload/desensitization threat posed by LightSquared’s November 2010 modification of license application in File No. SAT-MOD-20101118-00239.

<sup>3</sup> Recommendation of LightSquared Subsidiary LLC, IB Docket No. 11-109 (filed June 30, 2011) (“LightSquared Response”).

<sup>4</sup> The USGIC’s Comments were filed in IB Docket No. 11-109 and File No. SAT-MOD-20101118-00239 on August 1, 2011 (“USGIC Comments”).

interference to GPS, rendering all receivers and applications that rely on GPS dangerously inaccurate or even totally inoperable. The record is also crystal clear, despite LightSquared's protestations and inadequate alternative offerings, that allowing LightSquared to use the so-called "lower 10 MHz" channel at 1526-1536 MHz, at an EIRP of 32 dBW per sector, for terrestrial mobile broadband service will not eliminate the potential for harmful interference to the GPS receivers and GPS-dependent applications that operate in the 1559-1610 MHz band.

The USGIC recognizes that some commenters who agree that LightSquared's lower 10 MHz proposal is not a current option believe that it is appropriate for the Commission to initiate further studies designed to identify whether, and if so under what conditions, LightSquared may be able to use the 1526-1536 MHz portion of the MSS downlink band for terrestrial mobile broadband service. Others agree with the USGIC that the results of the TWG studies require the Commission to rescind the conditional waiver the International Bureau granted to LightSquared in January 2011. The USGIC does not oppose further studies designed to maximize the efficient terrestrial use of the MSS band, as long as there is something new to study. However, LightSquared's proposed maximum power level of 32 dBW per sector and its low-channel deployment concepts have already been addressed in the TWG Final Report, and were found insufficient. The "solution" LightSquared put on the table for the lower 10 MHz channel will result in harmful interference to GPS receivers, and thus it cannot be accepted.

**II. The Comments Confirm That Protection of GPS Receivers and GPS-Dependent Applications Requires the Commission To Exclude 4G LTE Service From the LightSquared MSS Bands – With No Exception for “Lower 10 MHz” Operation.**

**A. Comments from Across the GPS User Community Implore the Commission To Fulfill Its Responsibility to Protect GPS Receivers and GPS-Dependent Applications from Harmful Interference.**

More than 3,000 comments have been filed on the TWG Final Report and the LightSquared Response, and many of those are from GPS users who note with serious concern the potential for harmful interference from LightSquared to GPS, and demand that the Commission fulfill its responsibility to protect GPS receivers and GPS-dependent applications. The breadth of representation among the commenters includes the full range of GPS users and dependencies (from agricultural to aviation to mining to scientific),<sup>5</sup> public safety and infrastructure agencies and service providers,<sup>6</sup> state and local government officials,<sup>7</sup> and the manufacturing communities for both GPS receivers and the equipment and vehicles/vessels into which that equipment is integrated.<sup>8</sup> Commenters included some of the country’s largest corporations, such as Lockheed Martin Corporation (“Lockheed Martin”) (the nation’s only FCC

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<sup>5</sup> See, e.g., Comments of the North Carolina Soybean Producers Association, at 1 (filed July 27, 2011); Comments of the Air Line Pilots Association, International, at 3 (filed July 29, 2011); Comments of Newmont Mining Corporation, at 1-2 (filed August 1, 2011) (“Newmont Comments”); and Comments of OrbiTech, Inc., at 1-2 (filed July 31, 2011) (“OrbiTech Comments”).

<sup>6</sup> See, e.g., Comments of the Wisconsin Department of Transportation, at 1 (filed July 28, 2011); Comments of the Kentucky Transportation Cabinet, at 1-2 (July 25, 2011); Comments of the Governor of Oregon’s Geographic Information Council, at 2 (filed July 29, 2011); Comments of the Passenger Vessel Association, at 2 (filed July 28, 2011); Comments of the American Association of State Highway Transportation Officials, at 1 (filed July 29, 2011) (“AASHTO Comments”).

<sup>7</sup> See, e.g., Comments of the City of Bellevue, Washington, at 1 (filed July 28, 2011); City and County of San Francisco Department of Emergency Management, at 2-3 (filed July 29, 2011); Comments of the City of Seattle and the Association of City-County Information Systems Managers of the Washington State, at 3-6 (filed July 29, 2011).

<sup>8</sup> See, e.g., Comments of Garmin International, Inc. (filed August 1, 2011 (“Garmin Comments”); Comments of Trimble Navigation Limited (filed August 1, 2011) (“Trimble Comments”); Comments of Deere & Company (filed August 1, 2011) (“Deere Comments”); Comments of NovAtel Inc. (filed July 26, 2011) (“NovAtel Comments”); Comments of Caterpillar, Inc., at 3 (filed July 29, 2011); Comments of the Association of Equipment Manufacturers, at 2 (Filed August 1, 2011).



licensee of space stations operating in the 1559-1610 MHz radionavigation-satellite service (“RNSS”) band),<sup>9</sup> as well as thousands of individuals who use GPS equipment in their professions and daily lives.<sup>10</sup> Even foreign providers and users of the RNSS weighed in.<sup>11</sup> The message from all of these commenters was constant: GPS reception would inevitably suffer harmful interference if LightSquared were allowed to deploy a 4G LTE terrestrial mobile broadband system in the 1525-1559 MHz and 1626.5-1660.5 MHz bands, and the Commission must do everything it can to prevent that from happening.

It is extremely important for the Commission to take note of the fact that thousands of people who rely on the availability of GPS in their everyday lives took the time and interest to make their views known directly to the Commission. Most of these statements are not canned responses to a systematic publicity effort, but instead reflect the genuine, heartfelt, and often emotional entreaties of people from all walks of life and all parts of the country who are truly shaken by the prospect that the Commission has even conditionally allowed LightSquared to offer a high-power terrestrial service that has now been shown to harm GPS.<sup>12</sup>

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<sup>9</sup> RNSS is the international name of the radiocommunication service in which GPS operates.

<sup>10</sup> See, e.g., Comments of Lockheed Martin Corporation (filed July 29, 2011) (“Lockheed Martin Comments”); Comments of ITT Corporation (filed July 30, 2011); Comments of David L. Vliem (Professional Land Surveyor), at 1 (filed July 18, 2011); Comments of Andrew Aceves (Professional Geologist), at 1 (filed July 18, 2011); Comments of Scott Naumann (Air Line Pilot and Aircraft Owner), at 1 (filed July 19, 2011).

<sup>11</sup> See Comments of the Japan Aerospace Exploration Agency (“JAXA”), at 1-2 (filed July 28, 2011) (“JAXA Comments”) (expressing concern over the possible interference to earth stations in Hawaii and on Guam that monitor the signal of Japan’s Quasi Zenith Satellite System in the RNSS); Comments of the International Civil Aviation Organization (“ICAO”), at 2 (“ICAO Comments”) (admonishing that compatibility of GPS and the LightSquared proposal to operate on the lower 10 MHz channel alone cannot be assumed).

<sup>12</sup> See, e.g., Comments of Nathan Zink, at 1 (filed July 29, 2011). Mr. Zink identifies himself as affiliated with a surveying company that uses six GPS receivers that collect field data using networked real-time kinematic receivers to stake construction points and property markers. Mr. Zink states that:

Our investment in equipment alone exceeds \$75k. \$75k is not much when it is other people’s money. It is a lot when it comes out of your own pocket. The majority of our work is for infrastructure improvements such as bridges and highways. If we are down because cell phone usage knocks out our receivers, how do we explain to a transportation department that we cannot

This proceeding must continue to focus on the science, as the USGIC has argued. Nevertheless, it should not go unnoticed by others in government that there are real people with real jobs and real businesses and real interests who stand to suffer greatly and directly and in significant numbers if the Commission does not step in and enforce its rules and policies regarding the ancillary terrestrial component (“ATC”) of L-band MSS and the obligations of any MSS/ATC licensee to resolve all instances of harmful interference.

**B. Detailed Comments Raise Additional Issues About LightSquared’s Response And Reinforce Points the USGIC Raised in its Comments.**

Of the commenters that delved into the details of the TWG Final Report and the LightSquared Response, the views expressed are supportive of and similar in most respects to the views of the USGIC, as expressed in the USGIC Comments. Nearly all commenters agreed with the USGIC that the TWG Final Report unequivocally concludes that LightSquared’s proposed three-phase deployment plan (i.e., the filed plan that proposes terrestrial mobile broadband service on channels in both the upper and lower portions of the 1525-1559 MHz band) would cause harmful interference to GPS receivers and GPS-dependent applications, and that there is no basis in the TWG Final Report for any present determination that the interference effects can be mitigated. Specifically, the comments reflect that even the lower 10 MHz-only proposal from LightSquared’s Response would not protect GPS and mitigate the devastating harmful

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satisfy the requirements of the project? I need to know that the data we collect is reliable. I get concerned when my professional survey license is on the line.

Standing in stark contrast with Mr. Zink’s message are a pair of letters from local politicians in Washington State and Kentucky, who level identical (except for typographical errors) unfounded and demonstrably incorrect criticisms against GPS. See Letters dated July 27 and July 29, 2011, from Ross Gallagher and Stephen R. Johnson, respectively, in IB Docket No. 11-109. As do several others in the above-captioned docket and file, the former Mercer County (WA) commissioner and the County Attorney of Wolfe County, Kentucky state indignantly that “[t]he GPS community has had eight years to prepare for this day. The American people should not need to wait further - and certainly not indefinitely - to accommodate the GPS industry’s procrastination.” The Commission needs to heed the views of Mr. Zink and thousands of others like him; the views echoed by Messrs. Gallagher and Johnson, and others who have no cognizable connection to the technical issue at hand, are entitled to little or no weight.

interference that would result from LightSquared's introduction of high-power terrestrial broadband service into the L-band MSS spectrum.<sup>13</sup>

Importantly, several commenters raised additional concerns or amplified further upon concerns that the USGIC raised. With respect specifically to the "lower 10 MHz" prong of LightSquared's Response, Lockheed Martin Corporation ("Lockheed Martin") and the Aerospace and Flight Test Radio Coordinating Council ("AFTRCC") flagged the possibility of interference to aeronautical flight-test telemetry operations in the frequency band immediately adjacent to the lower end of the 1525-1559 MHz MSS/ATC band.<sup>14</sup> This is an extra-GPS dimension to the lower 10 MHz-only element of LightSquared's Response that was not addressed at all in the TWG Final Report, and provides a clear warning about the danger of unintended consequences from hastily-interposed "solutions." If there is any further investigation of possible LightSquared operation on the lower 10 MHz, then the issues raised by Lockheed Martin and AFTRCC would require careful exploration.

Other commenters provided detailed discussions of the interference risk that is posed to GPS receivers by the LightSquared 4G LTE terrestrial broadband handsets that are planned for transmission in the 1626.5-1660.5 MHz MSS uplink band.<sup>15</sup> Deere & Company, for example,

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<sup>13</sup> See, e.g., Comments of Aircraft Owners and Pilots Association and General Aviation Manufacturers Association, at 20 ("AOPA/GAMA Comments"); Deere Comments at 28-30.

<sup>14</sup> See Lockheed Martin Comments, at 9-10; Comments of the Aerospace and Flight Test Radio Coordinating Council, at 3 (filed August 1, 2011). The issue over the aeronautical mobile telemetry band was also included in the Report on LightSquared interference to GPS that was issued by the National Space- Based Positioning, Navigation, and Timing Systems Engineering Forum ("NPEF"). See "Assessment of LightSquared Terrestrial Broadband System Effects on GPS Receivers and GPS-Dependent Applications" ("NPEF Report") (June 1, 2011). A public version of the NPEF Report is included in the record of the *LightSquared* proceeding. See File No. SAT-MOD-20101118-00239, Letter dated July 6, 2011, from L. Strickling, NTIA Administrator, to J. Genachowski, FCC Chairman, at Enclosure.

<sup>15</sup> The USGIC addressed this issue as well, noting that time pressures and the unavailability of any prototype handsets for testing meant that this necessary assessment of the impact of LightSquared handsets did not occur within the TWG. USGIC Comments at 11.

noted that two of the TWG sub-teams had found the possibility of handset interference to GPS receivers at distances of less than one meter to as far as 1400 meters, and stated that its own post-TWG analysis “indicates that [handset interference] may be as important a source of interference as the base station signals.”<sup>16</sup> Garmin International’s analysis showed service degradations to GPS receivers from LightSquared handsets at distances of over one meter, and stated that these “results mean that GPS receivers located in close proximity to a LightSquared handset – such as in the same vehicle, aircraft, or even in a person’s hand or pocket – will experience harmful interference from LightSquared handheld devices.”<sup>17</sup> Like the USGIC, Garmin International also noted that the increased potential for interference from a scenario involving multiple LightSquared handsets (i.e., aggregate interference) was not studied at all in the TWG.<sup>18</sup> This issue too is one that requires exploration if any further investigation of a possible LightSquared operation on the lower 10 MHz channel occurs.

Another point raised in the comments was the observation by Clearwire Corporation (“Clearwire”) that the “unrealistic antenna downtilt” used in LightSquared’s antenna configuration results in the understatement of the most severe interference zones near a LightSquared tower.<sup>19</sup> The USGIC addressed this point in its own Comments,<sup>20</sup> but Clearwire goes into additional detail, noting that by using an unrealistic beam downtilt figure that understates antenna downtilt by up to 10 degrees in urban settings, up to 6 degrees in suburban settings, and by four degrees in rural scenarios, LightSquared has managed to devise a scenario

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<sup>16</sup> Deere Comments, at 32 and Exhibit 1.0.

<sup>17</sup> Garmin Comments at 49-50.

<sup>18</sup> *Id.* at 50.

<sup>19</sup> See Clearwire Corporation, GPS Interference Report, at 9-10 (filed July 14, 2011) (“Clearwire Report”).

<sup>20</sup> USGIC Comments at 10-11.

whereby the main lobe of its antenna (the portion where the worst interference would be experienced) is pointed away from the base of the tower and to where the signal would be attenuated by distance. As Clearwire recites, “[b]ecause LightSquared’s actual deployment is likely to use downtilt values that put the main lobe closer to the tower base, more severe interference can be expected.”<sup>21</sup> LightSquared thus tends to understate the interference impact of its proposed 4G LTE operation.

Still other commenters added to or reinforced points the USGIC made in showing the false and misleading nature of LightSquared’s unattributed claims that interference to GPS receivers is somehow acceptable because only a small percentage of GPS receivers would be affected by a lower 10 MHz-only operation;<sup>22</sup> that filtering, even if available today, would not be a viable mitigation technique because of the impact filtering would have on measurement accuracy;<sup>23</sup> and that there is no basis for LightSquared’s “standstill” and associated expectation

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<sup>21</sup> Clearwire Report, at 10. On July 27, 2011, LightSquared filed a reply that ostensibly addressed the highly technical report that Clearwire filed two weeks earlier. LightSquared never addressed Clearwire’s antenna downtilt point, but it did manage to accuse Clearwire of being “driven by anticompetitive motives . . .” and assert that Clearwire was at fault for installing GPS timing receivers in its network that did not include filters needed to mitigate overload interference . . .” See LightSquared Reply to Clearwire Corporation, File No. SAT-MOD-20101118-00239 and IB Docket No. 11-109, at 2 (filed July 27, 2011).

<sup>22</sup> See, e.g., Newmont Comments, at 1 (LightSquared’s conclusion that less than one percent of GPS receivers is affected “is based on raw numbers of receivers without taking into consideration either the lost capital cost of the affected equipment or the economic impact on interrupted operations”); OrbiTech Comments at 1 (treating the 0.5% of affected receivers per LightSquared’s assessment as collateral damage “does sound acceptable until one analyzes what types of activities those 0.5% of receivers are used to accomplish. The answer is that they are all used in precise positioning or timing for activities such as positive train control, precision aircraft approaches, precise timing of power grids and financial transactions, earthquake and volcano monitoring, [and] . . . precise positioning for surveying and mapping. Ignoring those 0.5% of users essentially moves all of those activities back to pre-GPS methods in the early 1980’s”).

<sup>23</sup> See, e.g., Garmin Comments, at 52 (“To achieve the high level of rejection required to eliminate the high powered LightSquared transmissions from a GPS receiver, any potential filter must necessarily reject some of the GPS signal as well”); Comments of Glen Borkenhagen, at 2 (explaining that “[w]hen heavy filtering is applied to remove strong near-band interference, the signal edge transitions get rounded, blurred, and even time-displaced so determining an accurate arrival time [for the GPS signals] becomes much more difficult if not impossible”) (“Borkenhagen Comments”).

that the upper 10 MHz channel in the 1525-1559 MHz band would someday be available for 4G LTE mobile broadband use.<sup>24</sup>

All in all, thoughtful and detailed comments from GPS equipment manufacturers such as Deere & Company, Garmin International, NovAtel Inc., Tom Tom Inc., and Trimble Navigation; key GPS private sector users such as United Airlines, UPS, Verizon Wireless, and Caterpillar, Inc.; key public sector users such as the City and County of San Francisco Department of Emergency Management, the City of Seattle, and numerous state transportation agencies; and interested watchdog organizations such as the the Association of Public Safety Communications Officials International (“APCO”), the American Association of State Highway Transportation Officials (“AASHTO”), and the National Public Safety Telecommunications Council (“NPSTC”), add depth and valuable context to the demonstrations made by USGIC and myriad others of the severe impact that LightSquared’s proposed 4G LTE operations would have on GPS receivers in various applications. The comments also underscore the fact that LightSquared has drastically underestimated the pervasive number and types of affected GPS receivers and GPS-dependent applications in an effort to lull the Commission and other watchful regulators into a false and dangerous sense of complacency about the impact LightSquared’s proposed operations – even the lower 10MHz-only operations LightSquared tries to drape in a mantle of compromise. No amount of denial or blaming the victim by LightSquared can change the fact that the new, billion-plus times more powerful signal LightSquared seeks to introduce into the 1525-1559 MHz band to supplant its MSS service in urban areas would devastate the hundreds

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<sup>24</sup> See, e.g., Comments of Verizon Wireless, at 9 (urging the Commission to “suspend indefinitely LightSquared’s ATC authority to operate in the upper 10 MHz channel”); Comments of United Parcel Service, Inc., at 1-2 and 5-6 (citing the “unacceptable threat” LightSquared poses to United Parcel Service (“UPS”) operations, including airplanes and over 50,000 UPS delivery trucks which use GPS-dependent applications, UPS urges the Commission “immediately to withdraw” LightSquared’s waiver for the upper 10 MHz channel).

of million Americans (and billions of more people around the world) who rely on GPS and other RNSS systems every day.<sup>25</sup>

### **III. The USGIC Comments Fully Respond to the Charges and Claims Made in Comments from LightSquared and its Affiliates.**

For the most part, the remaining comments are either from LightSquared and its affiliates,<sup>26</sup> or call for additional broadband spectrum without regard to the GPS interference issue.<sup>27</sup> None of these comments add anything of value to the post-TWG record.

In its comments, LightSquared tries to make two points: First, LightSquared claims that “some in the GPS industry” are “trying to force LightSquared to vacate the [MSS] band.”<sup>28</sup> Second, LightSquared contends that the interference threshold with respect to general location/navigation receivers “is faulty,” and classifies GPS devices as experiencing overload in cases where, from the user’s perspective, the devices are “functioning properly.”<sup>29</sup> LightSquared asserts that when these imagined transgressions against LightSquared are rectified, only a

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<sup>25</sup> In its Comments, the USGIC showed how LightSquared’s signal is in fact more than one billion times the strength of the signal GPS receivers are designed to receive and process, and that this disparity – caused entirely by LightSquared – is the source of the interference issue to GPS. *See* USGIC Comments at 32 & n.76. Others state that the difference in signal strength is many times greater. *See* Caterpillar Comments, at 3 (asserting that LightSquared’s signal is fully 794 billion times more powerful than GPS). This is not a question of unreasonable GPS vulnerability, but of LightSquared transmitter power levels that have no place in a satellite “neighborhood” populated by services that rely – and do so quite reasonably and in accordance with the national and international Tables of Frequency Allocations – on reception of low-power signals.

<sup>26</sup> *See, e.g.*, Comments of LightSquared Subsidiary LLC (filed August 1, 2011) (“LightSquared Comments”); Comments of Sprint Nextel Corporation (filed August 1, 2011) (“Sprint Comments”); Comments of Open Range Communications, Inc. (filed August 1, 2011) (“Open Range Comments”). Neither Sprint nor Open Range add anything new to the record; both merely parrot the deficient arguments of their business partner.

<sup>27</sup> *See, e.g.*, Comments of the Computer & Communications Industry Association (“CCIA”) (filed July 29, 2011). CCIA makes no technical TWG-related arguments at all, focusing exclusively on the alleged public interest benefits of an increase in spectrum available for terrestrial mobile broadband use. *See also* Comments of New America Foundation, et al., at 6-7 (filed August 1, 2011) (urging a broadband-first approach that is disconnected from the realities of physics and the long-standing U.S. and international spectrum allocation policies),

<sup>28</sup> LightSquared Comments at 2.

<sup>29</sup> *Id.*

“relatively few remaining wideband GPS receivers” might be “affected” by “the overload issue.”<sup>30</sup>

LightSquared’s arguments are thoroughly deconstructed in the comments lodged in the record by the USGIC and many others. As the USGIC demonstrated in its Comments, LightSquared’s recommended “solution” is no such thing. LightSquared’s proposal to commence 4G LTE operations immediately using the lower 10 MHz channel at 1526-1536 MHz was found wanting by all seven TWG sub-teams. Not one group was prepared to state that operations would be compatible with the devices that group tested.<sup>31</sup> LightSquared’s tactic of inventing an unsupported and unsupportable interference metric for general location/navigation receivers – one that cuts against all of the technical studies in the International Telecommunication Union (“ITU”) expert groups and the Commission’s own precedent – is nothing more than a transparent attempt to claim that hundreds of millions of GPS receivers in use today would be unaffected by LightSquared’s lower 10 MHz operation, leaving “only” the half-million high-precision receivers at risk.<sup>32</sup> No one on the GPS side of this issue wants to force LightSquared from its licensed spectrum; to the contrary, all anyone wants to do is to ensure that LightSquared uses its MSS/ATC spectrum for the purposes for which the spectrum was allocated and assigned prior to the attempt by LightSquared’s opportunistic new owners to convert that spectrum from MSS/ATC use to stand-alone 4G LTE use that is incompatible both with GPS *and* with MSS/ATC. LightSquared is no victim.

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<sup>30</sup> *Id.* at 3.

<sup>31</sup> See USGIC Comments at 19 (“The TWG was unable to conclude – for *any* sub-team – that LightSquared 4G LTE operation on only the lower 10 MHz channel is a viable mitigation technique”).

<sup>32</sup> *Id.* at 20-25.



**A. LightSquared Continues to Engage in Attempts To Revise History; There Is No Merit To LightSquared's Assertion That the GPS Industry Should Have Been Prepared for a New High-Power Mobile Broadband Service in the MSS Ancillary Terrestrial Component.**

The only thing the 4G LTE terrestrial mobile broadband operation LightSquared now proposes has in common with the ancillary terrestrial component of MSS as established in the Commission's Rules and previously authorized to LightSquared's MSS predecessors is the word "terrestrial." In its Comments, the USGIC thoroughly refuted LightSquared's repeated contention that the GPS industry should have known (and thus is to blame for not modifying its designs to anticipate) that high-power stand-alone terrestrial mobile broadband service was coming to the MSS bands licensed to LightSquared.<sup>33</sup> No signals were missed. Notwithstanding LightSquared's blatantly self-serving attempts at revisionist history, there is absolutely no question that prior to the January 2011 *LightSquared* decision, MSS ATC was strictly an ancillary and limited terrestrial adjunct to LightSquared's MSS system – a "gap filler" to permit ubiquitous service *by MSS operators* in circumstances where satellite service might be degraded by man-made or natural barriers.

Various other commenters have expressed views regarding LightSquared's "revisionist history" argument that echo those expressed by the USGIC. Trimble Navigation asserts that LightSquared's version of the regulatory history "is demonstrably wrong."<sup>34</sup> Trimble Navigation finds the LightSquared argument inconsistent with repeated Commission assurances that it would vigorously enforce the integration requirement and related "ancillary" status of any terrestrial operations in the MSS band and states that "[t]here was no way that the GPS industry could have reasonably anticipated that the FCC would waive the rule which serves as the

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<sup>33</sup> *Id.* at 34-39.

<sup>34</sup> Trimble Comments, at 7.

foundation for ATC in the L-Band: that terrestrial services must be ancillary to and integrated with the primary satellite service.”<sup>35</sup> In its comments, Verizon Wireless states that:

LightSquared’s assertion that GPS manufacturers could have altered receiver design beginning in 2003 ignores the fact that the Commission’s MSS ATC rules and precedent have consistently stated that ATC services must be ancillary to primary, satellite services provided by MSS. GPS manufacturers therefore could not have anticipated that the Commission would reverse course by allowing LightSquared to build what is basically a terrestrial network, thereby undercutting the premise of ATC altogether.<sup>36</sup>

Deere & Company strikes a similar chord, stating:

Even a generous reading of the Commission’s orders, rules and contemporaneous Commissioner statements regarding MSS ATC authorizations reveals exactly the *opposite* plan – the Commission was careful to adopt a scheme specifically designed to *prevent* ATC from becoming a ubiquitous terrestrial CMRS network overtaking the primary satellite purpose. Further, it is disingenuous for LightSquared to suggest that all GPS stakeholders therefore “knew” or even “should have predicted” all along that the Commission would waive the satellite integration criteria to permit a stand-alone high power network in the MSS band. Deere and other high precision receiver manufacturers have made sound design decisions – indeed necessary design decisions – in developing wideband receivers.<sup>37</sup>

These are all correct readings of the Commission’s rules and decisions regarding ATC.

LightSquared’s fallacious argument to the contrary is untenable.

In a particularly inappropriate corollary to its assertion that the entire GPS industry has ignored nearly a decade of decisions that point inexorably to the conversion of the MSS bands into terrestrial mobile broadband spectrum, LightSquared again tries to reinterpret the long history of GPS-industry cooperation with the ATC aspirations of LightSquared’s predecessors against GPS in general and the USGIC in particular.<sup>38</sup> To be clear, “the GPS industry” has never

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<sup>35</sup> *Id.*

<sup>36</sup> Verizon Comments, at 15.

<sup>37</sup> Deere Comments, at 8 (emphasis in original, footnotes omitted).

<sup>38</sup> See LightSquared Comments at 4.

endorsed or approved what LightSquared now claims are its long-standing plans. It strains credulity for LightSquared to try to characterize the long history of GPS-industry cooperation with its MSS neighbors' efforts to maximize the utility of their MSS and MSS/ATC authorizations as prior endorsements of stand-alone high-power terrestrial mobile broadband service. As the USGIC stated in its Comments, the position of the USGIC and the GPS industry has not changed; instead, LightSquared is the entity that fundamentally altered the intended use of ATC when it sought, in November 2010, to operate a stand-alone high-power co-primary terrestrial signal in its MSS bands instead of an ancillary gap-filler.

**B. LightSquared's Continued Critique of GPS Receiver Designs and Sensitivities Is Misplaced; GPS Receivers Are State-of-the-Art Devices.**

There is no basis whatsoever to LightSquared's assertions that harmful interference from LightSquared's 4G LTE operation will occur "only because legacy GPS receivers are unable to reject sufficiently" LightSquared transmissions, and that the interference issue "is one of the GPS industry's own making and could have been avoided."<sup>39</sup> The USGIC thoroughly debunked this LightSquared assertion in its Comments, demonstrating that GPS receivers are exceptionally advanced pieces of equipment that are well designed for the spectrum environment in which they operate, and that the notion that GPS receiver filtering either needs to be improved or in fact could be improved without unacceptable performance penalties is wrong on all counts.<sup>40</sup>

Other commenters agree with the USGIC that LightSquared's assertion that that filtering should or even can be improved is off base. In their letter, the Chairman and Vice Chairman of the Space-Based Positioning, Navigation, and Timing National Advisory Board ("National PNT

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<sup>39</sup> *Id.* at 10.

<sup>40</sup> See USGIC Comments at 29-34, 56-57. In particular, the USGIC emphasized that GPS receivers already employ multi-stage filtering that is designed to preserve the GPS signal and reject all other expected inputs. *Id.* at 13 & n.29.

Advisory Board”) observed that “sophisticated, well-designed GPS devices can easily tolerate power levels in adjacent bands that are one million times stronger than GPS in the adjacent MSS band. However, the proposed power levels [from LightSquared] are 5 billion times stronger than GPS. They cannot be ‘filtered’ without gravely crippling GPS productivity gains.”<sup>41</sup> Although LightSquared subsequently filed a response to the National PNT Advisory Board letter, its response does not address the quoted point.<sup>42</sup>

On August 11, LightSquared filed a new letter that continues its strategy to disseminate false information about GPS to mask its intention to convert a frequency band allocated to a satellite service into a terrestrial band.<sup>43</sup> In the August 11 Letter, LightSquared misconstrues technical materials and misrepresents the relationship between signal standards and receivers. In particular, LightSquared tries to claim that the Standard Positioning Service (“SPS”) performance standard for the GPS Signal in Space (“SIS”) somehow translates into an expectation that GPS receivers would filter out transmissions from the adjacent band in which LightSquared operates.<sup>44</sup>

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<sup>41</sup> Letter dated August 3, 2011, from James R. Schlesinger (Chairman) and Bradford Parkinson (Vice Chairman) of the National PNT Advisory Board, to J. Genachowski, Chairman, FCC, in IB Docket No. 11-109 (“National PNT Advisory Board Letter”). *See also* Comments of the Air Line Pilots Association, International, at 3 (filed July 29, 2011) (making the same point as the National PNT Advisory Board, but adding that during Las Vegas live-sky testing, “the highest recorded [LightSquared] power levels were *800 billion times* the power of GPS signals,” and noting that filters “cannot block out signals that powerful in an immediately adjacent frequency band”) (emphasis in original).

<sup>42</sup> *See* Letter dated August 8, 2011, from J. Carlisle, LightSquared, in File No. SAT-MOD-20101118-00239 and IB Docket No. 11-109 (“LightSquared National PNT Advisory Board Response”). A particularly cogent explanation of why increased filtering, even if available, is not a panacea is contained in the Borkenhagen Comments (at 2).

<sup>43</sup> *See* Letter dated August 11, 2011, from J. Carlisle, LightSquared, in File No. SAT-MOD-20101118-00239 and IB Docket No. 11-109 (“August 11 Letter”).

<sup>44</sup> August 11 Letter at 2. LightSquared also makes a claim by taking material from ITU Recommendation M.1477 on RNSS receiver protection requirements for the 1559-1610 MHz band out of context. *Id.* at 3. Continuing its pattern of ignoring the fact that the 1525-1559 MHz band is not allocated for any terrestrial use of the kind LightSquared now seeks to make, it is clear that any reference in an ITU document from 2000 about taking adjacent-band interference into account did not contemplate the introduction of modern high-power terrestrial broadband signals that cause complete receiver desensitization.

LightSquared is wrong, and its arguments reflect its fundamental lack of technical understanding of GPS and the profound technical difference between how communication and satellite navigation signals operate and are received. First of all, the SPS performance standards have nothing whatsoever to do with GPS receivers. The standards describe the characteristics of transmissions from GPS satellites, not the characteristics of GPS receivers. In fact, the SPS standards specifically state (in Section 2.0) that the receiver characteristics used in the document provide a framework for defining the SPS performance standards, and “are not intended to impose any minimum requirements on receiver manufacturers or integrators, although they are necessary attributes to achieve the SPS performance described in this document.”<sup>45</sup> There is no requirement for a sharp cut off filter. The reference is to an ideal filter not used in or obtainable for real-world conditions. Hypothetical filter characteristics were used to illustrate reception techniques, not as requirements for performance. There are no DOD performance standards for commercial GPS receivers. In addition, the bandwidth characteristics for reception of GPS satellite signals – 24 MHz and 30 MHz – that LightSquared cites are minimum bandwidths that receivers trying to receive the signals require, not maximum bandwidths necessary to receive all of the information transmitted from government satellites.

LightSquared exacerbates this last error by contending incorrectly that “the requirements of a filter, were it met, would protect against the receipt of signals in the lower 10 MHz of LightSquared’s licensed L-band.”<sup>46</sup> First, LightSquared’s “licensed L-band” is for MSS, not terrestrial broadband signals more than one billion times more powerful than the GPS satellite signal just 23 MHz away. All of the problems posed by LightSquared’s proposed operational

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<sup>45</sup> Global Positioning System Standard Positioning Service Performance Standard, 4<sup>th</sup> Edition, at 7 (Section 2.0) (September 2008).

<sup>46</sup> August 11 Letter at 2 n.6.

changes stem from the fact that LightSquared has proceeded as if it could do whatever it wanted with the spectrum licensed to it for MSS/ATC use, without regard to the Commission and ITU Tables of Frequency Allocations or the Commission rules that ensure that the “ancillary” in ATC means just that (i.e., subordinate to space-based service). Second, LightSquared has clearly ignored the TWG Final Report and the detailed comments of USGIC, Deere & Company, Garmin International, Trimble Navigation, and others that have explained how increased filtering, even if available or appropriate, would cause losses in accuracy that would have the same negative effect on the utility of these devices that harmful radiofrequency interference would have.<sup>47</sup>

The August 11 Letter changes nothing, and must be rejected as just another flawed effort on LightSquared’s part to deflect attention from the technical and regulatory inappropriateness of introducing 4G LTE service into the 1525-1559 MHz and 1626.5-1660.5 MHz bands. In fact, LightSquared is so focused on blaming the GPS manufacturers for failing to prevent the vulnerability to harmful interference from LightSquared’s lower 10 MHz-only operation, it overlooks the fact that it has conceded that harmful interference would be caused.<sup>48</sup>

**C. LightSquared Continues To Attempt To Influence Commission Decision Making By Relying on Irrelevant Factors.**

LightSquared continues to rely on factors that are irrelevant to the resolution of the harmful interference issues. In particular, LightSquared asserts that the GPS industry “ignores the \$4 billion that LightSquared has invested, in reliance on the technical rules it negotiated with

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<sup>47</sup> See, e.g., USGIC Comments at 16 (“The reduction in accuracy and other negative performance effects would be tantamount to harmful interference produced by LightSquared (rather than an indirect effect)”).

<sup>48</sup> See August 11 Letter, at 2 (“had the GPS industry complied with DoD’s recommended filtering standards for GPS receivers, there would be no issue with LightSquared’s operations in the lower portion of its downlink band”).

the GPS industry, to develop a state-of-the-art mobile broadband network.”<sup>49</sup> LightSquared also contends that it is somehow the GPS industry’s fault that the MSS bands would be rendered “unusable terrestrially at a time when the Executive Branch and the Commission have determined that the national interest requires coming up with an additional 500 MHz of spectrum for wireless broadband[.]”<sup>50</sup>

LightSquared’s attempts to interject factors intended to unduly and improperly influence Commission decision making must be rejected. Under clear Commission precedent, all LightSquared expenditures in pursuit of a 4G LTE, terrestrial broadband service in the MSS bands have been and will be at LightSquared’s exclusive risk, without prejudice to contrary Commission action. The USGIC showed in its Comments that this type of condition is standard in satellite licensing actions issued while a related major technical or regulatory point remains unresolved.<sup>51</sup> There is absolutely no reason or basis for the Commission to deviate from that practice here. The fact that LightSquared is the interloper here, trying to shoehorn a potentially lucrative but incompatible mobile broadband service into a segment of the radiofrequency spectrum that is particularly ill-suited for such use and where disruption to the orderly spectrum management scheme that has successfully existed for decades would be profound, only reinforces the fact that LightSquared alone must bear the consequences of its business choices. Commission review of the technical issues from LightSquared’s modification application, and eventual action contrary to LightSquared’s desires, must not be influenced in any way by actions

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<sup>49</sup> LightSquared Comments at 4.

<sup>50</sup> *Id.* at 5 (footnote omitted).

<sup>51</sup> USGIC Comments at 46-47 &n.115.

LightSquared has taken or expenditures LightSquared claims to have made in pursuit of its mobile broadband network.

Contrary to LightSquared's second contention, the fact that particular frequencies – including the L-band spectrum licensed to LightSquared for MSS service – may be technically incompatible with the provision of high-power terrestrial broadband mobile service is neither the fault of the GPS industry nor an indictment against broadband service. A Commission decision denying LightSquared the ability to proceed with its new plan to convert MSS bands to terrestrial mobile broadband use based strictly on technical incompatibility with satellite services in the same and adjacent bands would be no one's fault. Rather, it would be an engineering-based and fully-supported technical decision that does not undercut or disparage in any way the Commission's desire to find additional spectrum for wireless broadband use.

**D. LightSquared Continues To Seriously Understate Both the Number of GPS Receivers and GPS-Dependent Devices That Would Be Impacted By A LightSquared Lower 10 MHz-Only 4G LTE Operation and the Extent of the Impact.**

Approximately 100 million GPS receivers are in use today in the United States for general location/navigation applications. In a thoroughly transparent effort to remove these devices from the “universe” of GPS receivers that would be harmfully interfered with by a LightSquared lower 10 MHz-only 4G LTE operation, LightSquared invented a much more lenient technical metric (specifically the evaluation of this class of receivers using a trigger level of a reduction of at least 6 dB in the receiver's carrier-to-noise (“C/N<sub>0</sub>”) ratio and a randomized, non-free-space propagation model). Applying this metric of its own creation, LightSquared claims, both in the TWG Final Report and its own Comments, that all general



location/navigation receivers are compatible with a lower 10 MHz-only LightSquared 4G LTE operation.<sup>52</sup>

The USGIC refuted the newly-created LightSquared metric in its Comments, noting that a 1 dB reduction in  $C/N_0$  is the level that has repeatedly been used in ITU and prior Commission consideration of an appropriate value, and that there was no support in any technical literature for LightSquared's last-minute attempt to change the harmful interference metric for these receivers.<sup>53</sup> The stakes, of course, are high. Under the legitimate, 1 dB  $C/N_0$  degradation criterion that has scientific and regulatory precedent behind it, 20 out of the 29 devices tested by the TWG's General Location/Navigation sub-team (representing nearly 70 million currently-deployed devices) would suffer harmful interference from LightSquared's use of a single 10 MHz channel at 1526-1536 MHz.<sup>54</sup> This compares with only one device when LightSquared's baseless and inappropriately-relaxed metric is used.

In its comments, LightSquared maintains its untenable position that a 6 dB reduction in  $C/N_0$  and a randomized propagation model is "appropriate." Indeed, through vagueness in its argument, it seems content to contradict even consensus areas of the TWG Final Report and claim that the 1 dB/free-space model is "inappropriate" for any GPS devices.<sup>55</sup>

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<sup>52</sup> See LightSquared Comments at 6-10.

<sup>53</sup> USGIC Comments at 22-25. In its comments, Garmin International substantiates this point, noting that "[t]he 6 dB standard that LightSquared suggests represents a full seventy-five percent degradation in the  $C/N_0$  ratio, yet LightSquared provides no citation from accepted technical literature or engineering texts for its novel approach." Garmin Comments, at 45.

<sup>54</sup> TWG Final Report at 177.

<sup>55</sup> See LightSquared Comments at 6-7. While LightSquared now seeks to expand the beachhead it believes it has with the unilateral 6 dB criterion, the fact remains that even the graphic LightSquared included in its Response to demonstrate no impact at 6 dB from the case where there is no potentially interfering signal (LightSquared Response, Technical Appendix, at 12) shows that there is a one-to-two city block error for the 6 dB case. See Trimble Comments at 50. Garmin International reinforced this observation, noting that "[e]ven at LightSquared's suggested threshold of 6 dB degradation in the  $C/N_0$  ratio, . . . the test results show that harmful desensitization of GPS occurs with respect to a number of key performance indicators[,] including "a complete denial of service of

LightSquared's proposed definition of "harmful interference" as a 6 dB of degradation in C/N<sub>0</sub> ignores clear and convincing evidence that harmful interference is actually experienced at a level of 1 dB.<sup>56</sup> As Garmin International demonstrated in its comments, "there is absolutely no evidence to support the LightSquared assertion that 100 percent of [general location/navigation] devices experienced no problem with LightSquared's use of a lower 10 MHz channel."<sup>57</sup>

Receivers in the TWG's General Location/Navigation sub-team are used in innumerable settings, including public safety applications and maritime commerce.<sup>58</sup> Although LightSquared claims that the free-space propagation model used by the majority of the General Location/Navigation sub-team (and other sub-teams in the TWG) overstates the probability of interference, the USGIC maintains that it is totally inappropriate to use a propagation model that determines the probability of dropped cell-phone calls for purposes of link budget analysis to assess the accuracy of GPS in its essential safety-of-life role.<sup>59</sup> For GPS devices, including those used in general location and navigation applications, conservative and even worst-case assumptions are the appropriate assumptions to make. LightSquared's invention of a new

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[Wide Area Augmentation System ("WAAS") Time to First Fix ("TTFF")] for all five WAAS-enabled devices being tested – five out of five." Garmin Comments, at 45. Garmin went on to show that, at the same 6 dB measure, tests done by the TWG and included in the TWG Final Report revealed that 6 of 25 devices being tested could establish no fix within three minutes in one or more trials of a different TTFF analysis, and 11 of 25 experienced more than a thirty-second delay in acquiring a signal. *Id.* at 45-46.

<sup>56</sup> See Garmin Comments, at 41-48.

<sup>57</sup> *Id.* at 47. Garmin presented a detailed analysis that confirms that with LightSquared operation of a 4G LTE service limited to the lower 10 MHz channel and an EIRP of 32 dBW, general location/navigation GPS devices "are jammed at distances up to 1 km from the transmission tower." *Id.* at 43 & Figure 4.

<sup>58</sup> As one commenter noted, "police, sheriff and fire customers around the country . . . employ simulcast (multiple sites transmitting on the same frequency) in order to cover their geographies. GPS is crucial to matching [sic] frequencies, and aligning audio so that simulcast works. There are over 10,000 Public safety simulcast sites around the country that will be adversely affected if LightSquared is allowed to proceed in the bands they are attempting. There is no short term technical solution . . . ." See Comments of Simulcast Solutions, LLC, at 1 (filed July 18, 2011).

<sup>59</sup> See *id.* at 48.

“metric” that flies in the face of ITU and Commission precedent and has the sole attribute of attempting to reduce the number of GPS receivers that would be harmfully interfered with by a lower 10 MHz-only operation, must be definitively rejected. This is especially so when, as noted above and elsewhere, the assumptions about and characteristics of LightSquared’s own transmitters are overly lenient (e.g., in terms of electrical downtilt). LightSquared cannot have it both ways; it cannot hide behind lenient criteria of its own transmitters and decry as “unrealistic” and “needlessly conservative” the values long accepted in Commission and ITU studies. In fact, given the stakes, LightSquared should not be allowed to have it either way. The determination of the TWG General Location/Navigation sub-team participants other than LightSquared that 20 of 29 tested devices (i.e., nearly 70%) would suffer harmful interference from a lower 10 MHz-only 4G LTE operation must be fully credited by the Commission – and any further testing must reconsider the impact of unduly lenient electrical downtilt assumptions on the nine devices that were initially found to be compatible.

In the end, the test results show that nearly 70 million current GPS receivers and GPS-dependent applications from the general location/navigation category alone would be harmfully interfered with by LightSquared’s lower 10 MHz-only proposal. This is in addition to the 30 million or so cellular devices that were identified as harmfully-interfered with by the TWG’s Cellular sub-team,<sup>60</sup> and does not take into account trends toward wideband and multisystem RNSS use.<sup>61</sup> It also does not take into account the indirect impact that harmful interference to

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<sup>60</sup> See USGIC Comments at 20-21. Verizon Wireless expressed concern in its comments about how the TWG Cellular sub-team results were portrayed in the TWG Final Report and of the potential for lower 10 MHz-only operations to “disrupt critical location-based services employed by wireless networks and wireless users.” See Verizon Comments, at 9-11. See also AT&T Comments, at 7. Clearly, there were defects and shortcomings in the cellular device testing that would need to be rectified and addressed in any further testing on the lower 10 MHz impacts.

<sup>61</sup> USGIC Comments at 21. See also, National PNT Advisory Board Letter, at 2 (estimating that 22 million cell phones would be impacted by the LightSquared lower 10 MHz-only proposal, and citing wideband signal concerns).

GPS receivers and GPS-dependent applications would have on the hundreds of millions of people around the country and the billions of people around the world who rely every day on high-precision GPS receivers in multiple infrastructure applications. Several commenters echoed the concerns expressed by the USGIC on this point.<sup>62</sup>

LightSquared's claims about minimal impact from the lower 10 MHz-only prong of its latest proposal thus clearly understate both the number of affected GPS receivers and GPS-dependent applications, and trivialize the impact of the interference it admits such operation would cause to the hundreds of thousands of currently-deployed high precision receivers and the hundreds of millions of people who rely on the applications those devices permit.

**IV. There is No Current Reason for the Commission To Require Further Testing; As Proposed, LightSquared's "Solution" Will Cause Harmful Interference and Thus Must Be Rejected.**

In its Comments, the USGIC called for the rescission of the conditional waiver the International Bureau granted in *LightSquared*. It asserted that the TWG Final Report clearly showed that operation of LightSquared's proposed 4G LTE system on the lower 10 MHz channel, at 32 dBW EIRP per sector, would cause harmful interference to hundreds of millions of GPS users and dependencies. Many others echoed the USGIC's call for rescission of the waiver.<sup>63</sup>

Other commenters, however, including many who shared the USGIC's concerns about the impact of LightSquared's proposal for lower 10 MHz-only operation on GPS receivers and GPS-dependent applications, did not call for outright rescission of the conditional waiver.

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<sup>62</sup> See Trimble Comments, at 39-40; Newmont Comments, at 1.

<sup>63</sup> See, e.g., Lockheed Martin Comments, at 14; Deere Comments, at 34; Comments of the Association of Equipment Manufacturers, at 2; Comments of Caterpillar, Inc., at 3; AOPA/GAMA Comments, at 28-29.

Instead, these commenters would not permit LightSquared to deploy any 4G LTE services in the lower 10 MHz today, as LightSquared proposes, and in several cases demanded permanent or effectively permanent elimination of an upper 10 MHz option, but they would agree to further technical studies.<sup>64</sup>

The USGIC questions whether there is any basis for further testing of the specific lower 10 MHz-only option that LightSquared proposes in its Response. The studies done and reported in the TWG Final Report confirm that this operation would cause widespread harmful interference across GPS receiver categories. If, however, LightSquared identifies alternatives to the current 32 dBW EIRP, lower 10 MHz-only proposal that appear to have less potential for harmful interference to GPS receivers and GPS-dependent applications, and are indeed designed to maximize the efficient terrestrial use of the MSS band, the USGIC believes that there would be a basis for further study.

The USGIC emphasizes, however, that studies have to occur and be successfully completed before any LightSquared deployment is permitted. These studies must also be conducted under the auspices of the Commission directly or some truly independent entity; LightSquared cannot be put even nominally in charge of any further testing. Finally, the Commission would need to specifically include in the mandate for such tests the unexplored or unresolved issues that remain from the TWG Final Report and the current round of comments – e.g., handset emissions (both individual and aggregate), and correct LightSquared transmission parameters such as morphology-appropriate electrical beam downtilt.<sup>65</sup>

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<sup>64</sup> See, e.g., Verizon Comments at 9-14; Comments of Rockwell Collins Corporation, at 7 (filed August 1, 2011) (“Rockwell Collins Comments”); Comments of OnStar LLC (“OnStar”) at 2 (calling for permanent removal of the upper 10 MHz channel); AT&T Comments, at 9 (calling for a 10-year moratorium on consideration of the upper 10 MHz channel).

<sup>65</sup> Other areas identified for testing include the potential impact of LightSquared’s proposed lower 10 MHz-only plan on the next generation plan from the FAA for surveillance and control in the National Airspace System

In sum, unless there is a meaningful new proposal from LightSquared that moves away from the power levels and low-channel deployment concepts that have already been found in sufficient in the TWG Final Report, there is nothing new to study. The “solution” LightSquared put forth for the lower 10 MHz channel will result in harmful interference to GPS receivers, and thus is unacceptable.

**V. Section 25.255 of the Commission’s Rules Is Clear and Unequivocal in Its Requirement That LightSquared Must Resolve All Harmful Interference That Its Terrestrial Operations May Cause.**

The USGIC strongly disagrees with LightSquared’s assertion, in the LightSquared Reply to Clearwire, that Section 25.255 of the Commission’s Rules is, as a legal matter, inapplicable to interference an ostensible ATC operator in the 1525-1559 MHz and 1626.5-1660.5 MHz band produces outside that frequency range.<sup>66</sup> LightSquared provides no detail of its view, stating that it prefers to address the point in a separate proceeding.<sup>67</sup>

The USGIC addressed this point in some detail in its Comments.<sup>68</sup> Section 25.255 of the Commission’s rules, 47 C.F.R. § 25.255, is clear and unambiguous.<sup>69</sup> The responsibility to

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(including impacts on GPS position and velocity and their use in “ADS-B” automatic surveillance), and the impact on other RNSS systems such as Galileo, GLONASS, and the forthcoming GPS-III modernization of GPS. *See, e.g.*, Rockwell Collins Comments, at 13.

<sup>66</sup> *See* LightSquared Reply to Clearwire, at 4.

<sup>67</sup> *Id.* at 4 n.11.

<sup>68</sup> USGIC Comments at 32-34.

<sup>69</sup> *See* 47 C.F.R. § 25.255. Section 25.255, entitled “Procedures for resolving harmful interference related to operation of ancillary terrestrial components operating in the 1.5/1.6 GHz, 1.6/2.4 GHz and 2 GHz bands,” provides that:

If harmful interference is caused to other services by ancillary MSS ATC operations, either from ATC base stations or mobile terminals, the MSS ATC operator must resolve any such interference. If the MSS ATC operator claims to have resolved the interference and other operators claim that interference has not been resolved, then the parties to the dispute may petition the Commission for a resolution of their claims.

resolve interference issues rests exclusively with LightSquared, which nominally is an ATC operator. The obligation extends to “other services” – a phrase that would be meaningless under LightSquared’s apparent view, since there are no other services in the U.S. Table of Frequency Allocations in the 1525-1559 MHz band. LightSquared is clearly seeking to extend to GPS manufacturers and users the burden of mitigating interference that is, by FCC rule, LightSquared’s alone.

Other commenters support the view expressed by the USGIC regarding Section 25.255 of the Commission’s rules. Verizon Wireless, for example, notes that “ancillary terrestrial operations are required by law (and have always been required) to protect GPS receivers and all other primary services from interference.”<sup>70</sup>

Finally, it is unsettling to note that under its new, terrestrial-minded ownership, LightSquared is seeking to eschew responsibilities it once recognized and readily accepted. As the USGIC noted in its Comments, LightSquared has changed its tune on Section 25.255, and now blames GPS manufacturers for not designing receivers that adequately reject the same signals the Commission has said LightSquared (as the ATC operator) must resolve.

The Commission must emphasize to LightSquared that its responsibility to resolve harmful interference from ATC operations in the MSS bands extends to all other services in any other band. No other interpretation is tenable.

## **VI. Conclusion**

The comments submitted on the TWG Final Report and the LightSquared Response overwhelmingly coincide with the views stated by the USGIC in its Comments. LightSquared’s three-pronged proposal is insufficient. Unless there are new developments from LightSquared,

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<sup>70</sup> Verizon Comments, at 15.

the Commission has no choice but to rescind the conditional waiver and forbid any 4G LTE operation in the 1525-1559 MHz and 1626.5-1660.5 MHz bands.

Respectfully submitted,

**THE U.S. GPS INDUSTRY COUNCIL**

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August 15, 2011



## **CERTIFICATE OF SERVICE**

I, Deborah Morris, hereby certify that on this 15<sup>th</sup> day of August, 2011, a copy of the foregoing "Consolidated Reply Comments of The U.S. GPS Industry Council" is being sent via first class, U.S. Mail, postage prepaid, to the following (except for deliveries by hand and electronic mail, as noted):

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By: s/ Deborah Morris  
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